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Study of Theory and Application of Long Duration Heat Flux Transducers

The extreme thermal environments encountered in the base region and other areas of large rocket-powered vehicles have created special design problems which require a knowledge of the intensity of the heat transfer to be expected. To acquire this knowledge, heat transfer measurements have been made during scale model tests and flight tests of these vehicles.

During the early scale model "hot flow" testing of Saturn I the lack of existing knowledge and experience in heat flux measurements resulted in the accumulation of base heating data which was difficult, if not impossible, to analyze. To help overcome this lack of knowledge and experience, a study program was initiated and resulted in the development of instrumentation employing the latest state-of-the-art concepts for heat flux measurements.

An outline of the theory and application of the various types of heat flux transducers that are used to measure the "long duration" variety, that is, they are used in tests of more than a second's duration, is contained in a paper, "Theory and Application of Long Duration Heat Flux Transducers," by S. James Robertson and John P. Heaman.

The paper describes various devices and techniques for the measurement of heat flux. It discusses the principles of operation of the slug type sensor and the steady-state sensor and certain design parameters for these sensors. Also discussed are special considerations for the application of both radiation and convection measuring devices, and the various types of heat flux simulators used in calibrating heat flux transducers.

Note:

The paper described above is available from:

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Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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